THE COLEMAN JUNCTION HORIZON IN ARCHER AND CLAY COUNTIES,

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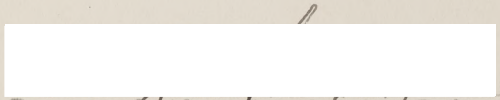

Dean of the Graduate School

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THE COLEMAN JUNCTION HORIZON IN ARCHER AND CLAY COUNTIES, TEXAS

THESIS

Presented to the Faculty of the Graduate School of
The University of Texas in Partial Fulfill-
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By

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Preface.

The problem of this thesis is to trace the outcrop of the Coleman Junction limestone or its equivalent horizon from the southwest corner of Archer County north to the Red River.

Conclusions are based on reconnaissance and detailed mapping by the writer in connection with geological work for The Texas Company and the Continental Oil Company, including a study of the area by air-plane from a point five miles southwest of Archer City to the Red River between Ringold, Texas, and Ryan, Oklahoma. The writer also had the pleasure of being a member of a field conference of geologists from Wichita Falls, Texas, and Ardmore, Oklahoma, which made a study of the Red River area in northeast Clay County and in the vicinity of Ryan, Oklahoma.

The area in which the Coleman Junction or its equivalent horizon was found exposed in Archer and Clay Counties was re-checked by reconnaissance field work, to verify correlations, obtain samples and pictures of the outcrop, and to measure sections.

Work on this thesis was aided by cooperation from several oil company geologists, in particular by Mr. V. E. Timms, formerly geologist for the Shell Petroleum Company.

The writer desires to express his appreciation for aid and advice extended by Dr. F. L. Whitney, Prof. F. B. Plummer, and especially by Dr. E. H. Sellards whose friendly criticism and suggestions have been invaluable.

Contents

Illustrations and Maps

The Coleman Junction limestone was mapped from Coleman County northward through Callahan and Shackelford counties by Plummer and Moore, and continued through Throckmorton County by Hornberger.

Work presented herewith carries the Coleman Junction or its equivalent horizon through Archer and Clay counties to the Red River in the northeast corner of Clay County. Photographs of typical exposures and measured sections of the outcrop or its equivalent horizon are given for important points, from northeastern Throckmorton County through Archer and Clay counties to the Red River. Two small maps are included showing correlations by Hubbard and Thompson, and by Tomlinson. Four large maps are used; one each of Archer and Clay counties showing the course of the outcrop or its equivalent horizon as interpreted by the writer; and one each of Archer and Clay counties showing the interpretation by Timms for the same area.

Although the tracing of the Coleman Junction or its equivalent horizon constitutes the central problem of this thesis, evidence is also presented indicating that the Coleman Junction correlates approximately with the Ryan Sandstone of Oklahoma.

Introduction.

The Coleman Junction limestone or its equivalent horizon is one of interest to those who enjoy an academic discussion of geological correlations, because it has been accepted as the contact bed marking the much disputed dividing line between the Pennsylvanian and Permian systems in north Texas.

This bed also has a practical interest for many because oil and gas fields are found at many places along its course, especially in Archer County. It has also been found a valuable marker for subsurface correlations northward into Wichita County, and thence westward to the oil fields of Wilbarger County. In Clay County the horizon is found near the old Nebraska-Texas oil well about eleven miles south of Henrietta, and tracing its course farther eastward leads one to the Gulf Company production on the Worsham ranch north of Bellevue. It has thus come to be a much discussed geological marker among oil men and geologists of this district. It has been closely associated with the romance and adventure, high hopes, disappointments, and occasional successes of many of those who play the oil game.

However, for this thesis the bed is considered purely from the standpoint of areal geology, and the work is concerned primarily with tracing its course across Archer and Clay counties.

Coleman Junction Limestone Southwest of Archer County.

In order to obtain a background of information concerning the nature of the bed in its typical exposures, showing its lithological characteristics and mode of topographic expression, it is desirable to make a preliminary survey of its course through the area southwest of Archer County.

Information on Coleman, Callahan, and Shackelford counties is given by Plummer and Moore. (1) From their bulletin data are obtained for the following descriptions of the bed in this area.

In Coleman County the Coleman Junction limestone forms a persistent, easily recognizable escarpment. The bed varies in thickness from three to fifteen feet, and in color from brown or yellow to gray. In many places it is fossiliferous, showing species of Upper Pennsylvanian types or closely related forms. There is a good exposure about a half mile south of Coleman Junction, where the bed shows as a nodular limestone with concretionary structure, in layers from six to twelve inches thick, with a total thickness at this point of from ten to twenty feet.

(1) Plummer, F. B.,and Moore, F. C.: Stratigraphy of the Pennsylvanian Formations of North Central Texas, University of Texas, Bulletin 2132, June 5, 1921, pp. 183 - 188.

Two miles southeast of Dressey, in the southeast corner of Callahan County, the Coleman Junction shows as a yellowish - brown limestone shading to gray in the lower part. The upper part of the bed is close grained, hard, platy, and very fossiliferous, although the fossils are not well preserved. This upper part weathers to platy pieces with smooth surfaces. The lower part of the bed here consists of several layers of gray, fine-grained, fossiliferous limestone, with a calcareous sandstone eight inches thick at the base. Total thickness of the bed at this location is three feet.

Two miles east of Admiral, in the central part of the east half of Callahan County, the bed consists of yellow limestone with some parts showing pink coloring. Here it has a thickness of five feet and weathers to dark fragments.

In the northeast part of Callahan County, eighteen miles southeast of Baird, the Coleman Junction limestone consists of an upper part which is of a bright yellow color, weathers to rounded lumps, and has a thickness of one foot; and of a lower part which is light gray, massive, partly fossiliferous, weathers to large slabs with rough surfaces, and has a thickness of three feet.

The Coleman Junction in the northern part of Shackelford County is a four foot limestone, of which the upper one foot is bright yellow, very ferruginous, and weathers to rounded pieces, whereas the lower three feet varies in color from gray to light buff.

For Throckmorton County the Coleman Junction limestone is described by Joseph Hornberger, Jr. in an unpublished manuscript on the geology of this county. From his description it is seen that the lithological character and topographic expression of the Coleman Junction as described by Plummer and Moore for Coleman, Callahan, and Shackelford counties are also characteristic for Throckmorton County. Hornberger describes the bed as forming a persistent and easily recognizable escarpment that extends across the county from the southern edge to the northeast corner. The bed varies in thickness up to fifteen feet, the thicker parts being composed of three layers of hard, brown limestone separated by yellow shales and marly limestone. Due to erosion there is in many places only one foot of limestone remaining on the edge of the escarpment.

The above descriptions indicate that from Coleman County to the northeast corner of Throckmorton County the Coleman Junction limestone varies in thickness from three to fifteen feet, the thicker parts being made up of three limestone beds separated by shale or marly limestone. The color varies from brown through various shades of yellow to gray. The weathered exposures may show slabs or rounded pieces. In general the texture is fine grained. Some parts are fossiliferous, but the fossils are not well preserved. Usually the upper parts are darker in color, and the lower parts are lighter, often

shading into gray.

The following photographs of the Coleman Junction limestone in northeastern Throckmorton County afford a basis for comparison with photographs of the bed or its equivalent horizon in Archer County, shown on pages 14 to 19.

Fig. 1. Location, 3.9 miles west of Elbert, 9.5 miles south and 6.5 miles west of the northeast corner of Throckmorton County, northwest corner of the T.E.L Survey No. 2190. Exposure in a cut on the Elbert-Throckmorton road. Limestone, hard, brown, crystalline, fine texture, fossiliferous with small fragments of shells and crinoid stems. Weathers to small pieces and thin plates. Thickness 1½ Ft. Underlain by gray shale.

Fig. 2. Location, 10 miles south and 7.5 miles west of the northeast corner of Throckmorton County, in T.E.L. Survey No. 3020. This is to show the way the limestone weathers to small pieces and thin plates. The hat at the left will give an idea of the scale. The bed here is three feet thick, crystalline, fine texture, fossiliferous with fragments of small shells and crinoid stems. Dark brown on top, shading to gray on the bottom.

Fig. 3. Location, Frederick Giebenrath Survey, north of the Salt Fork of the Brazos River, 1.5 miles south and 2 miles west of the northeast corner of Throckmorton County. The limestone is here exposed in the bed of a small creek near its confluence with the river. Limestone, blue to gray, hard, crystalline, fossiliferous with fragments of small shells and crinoid stems, texture coarser than in localities described farther south.

Fig. 4. Location, Giebenrath Survey, same as the preceding picture. The bed here is four feet thick, blue to gray, hard, crystalline, fossiliferous with fragments of small shells and crinoid stems. The tilted blocks show the rough weathering of the top surfaces.

From the above descriptions and illustrations it will be seen that the Coleman Junction limestone in the north - eastern part of Throckmorton County changes from brown to blue - gray, and varies in thickness from one and a half to four feet.

From the creek bed in the Giebenrath Survey the outcrop follows a course eastward to the village of Spring Creek on the Throckmorton - Young County line, one and three quarters miles south of the northeast corner of Throck-morton County. From Spring Creek it forms a well-defined escarpment north and northeast into Archer County to T.E.L. Survey No. 1596.

Coleman Junction Horizon in Archer and Clay Counties.

The Coleman Junction limestone southwest of Archer County forms a strong escarpment and is easily recognized, but its character rapidly changes toward the northeast in Archer County to a thin broken bed a few inches thick, and finally to merely occasional small pieces of nodular limestone and " peanut-brittle, nodular lime and clay-ball conglomerate", as described by Timms.

In the area where the Coleman Junction limestone thins and pinches out, there are some prominent beds of sandstone associated with it, one of these sandstone beds representing the same stratigraphic position as the limestone. This sandstone bed is not continuous over great distances, but by correlating with other sandstone beds above and below, it is possible to work out a logical and definite course for the outcrop of the Coleman Junction horizon across Archer County and northeast across Clay County to the Red River in the vicinity of Ringold.

Because the line as finally drawn is the result of correlations of several beds, some of the local interpretations may be open to question. But the final results are probably correct within fifty feet of stratigraphic measurement.

The character of the Coleman Junction or its equivalent horizon, and its changing phases as noted in tracing it toward the northeast across Archer County are shown by the

following nine figures. The stations are numbered and the corresponding numbers are placed along the line of outcrop as shown on the Archer County map. (Map No. 1.)

Station No. 1.

Fig. 5. Location, 2½ miles east and ¼ mile north of the southwest corner of Archer County, in a pasture along the west side of the northwest ¼ of T.E.L. Survey 1596. Coleman Junction limestone. Slabs of limestone three to four feet in diameter, standing partly on edge, weathering to small thin plates from two to six inches thick. Top surfaces of slabs smooth, lower surfaces pitted. Hard, crystalline, gray to blue. Some fragments of small shells. Thickness 1½ Ft.

From this station the bed continues northeastward forming a less distinct escarpment, but easily tracable to the T.E.L. Survey 2401 where road work has exposed some large blocks of the limestone, one of which is shown in the following photograph.

Station No. 2.

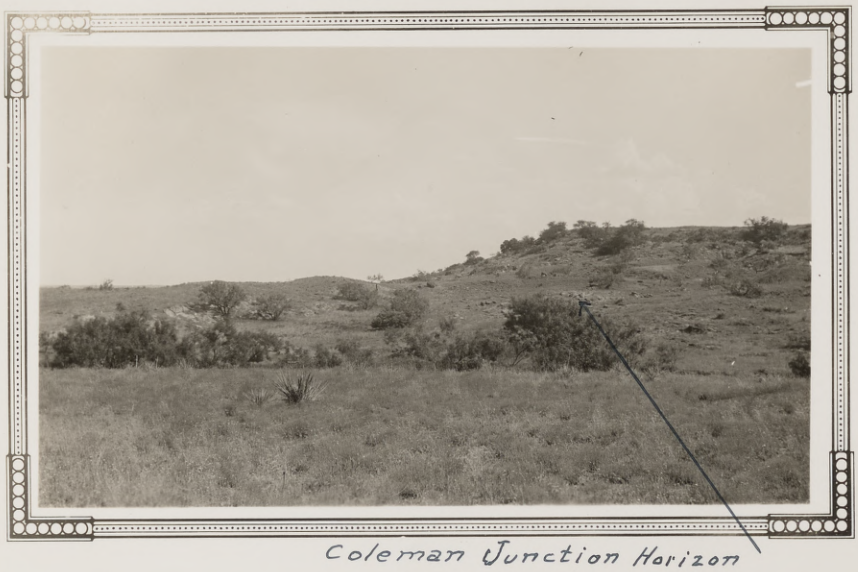
Fig. 6. Location, 4¼ miles east and 1 mile north of the southwest corner of Archer County, about the center of the north line of T.E.L. Survey 2401. The Coleman Junction limestone shows at many points along this part of the outcrop, occuring in the roads and as a well-defined bed which may easily be walked out. Usually the exposed pieces are gray, weathered, and pitted, often with deposits of secondary lime on the smaller pieces, giving the appearance of caliche. At this location some large blocks have been removed for road work. The pitted surface of one of these is shown. A yard stick is used for scale. Hard blue-gray crystalline limestone, one foot thick.

The bed becomes less well defined, but is tracable northeast through the Swastika Oil Field to the north edge of the field on the George P. Diggs Survey, where one finds the northern limit of its exposure as a continuous bed of limestone.

Station No. 3.

Fig. 7. Location, George P. Diggs Survey A - 119, South Anderson Ranch Subdivision, four miles east of Megargel. The last definite exposure of the Coleman Junction limestone in walking the bed in a general northeast direction from the southwest corner of Archer County. A few small pieces are shown at the right of the hat. The larger piece is pitted.

The Coleman Junction limestone at Station No. 3 is closely associated with a brown sandstone two and a half feet thick. The relation of the two beds is not clear because of poor exposure, but apparently the base of the sandstone comes in at the same stratigraphic position as the top of the Coleman Junction limestone. From Station No. 3 the Coleman Junction horizon is followed by tracing the sandstone bench northward to Section 19, S.P.R.R. Survey A - 439.



Station No. 4.

Fig. No. 8. Location, Section 19, S.P.R.R. Survey A - 439, 4 miles east and 1 mile north of Megargel. Also located as being about 1/8 mile west and south of the northwest corner of Section 3, S.P.R.R. Survey A - 1337. This picture shows the Coleman Junction horizon and the escarpment formed by a bed of soft gray sandstone four feet thick, fifty feet above the Coleman Junction horizon at this place. This escarpment continues southward nearly to Station No. 3 and gives a good basis for correlations. The Coleman Junction horizon is represented here by a bed of soft white sandstone and sandy shale two feet thick, associated with a gray sandstone one and a quarter feet thick, which forms its own escarpment farther northeast. The picture exaggerates the apparent height and distance of the high escarpment.

From Station No. 4 correlations are carried forward by using a series of escarpments similar to the one here shown, the course of the horizon outcrop continuing northeast toward Archer City.

Station No. 5.

Fig. 9. Location, Block 86, Harris Subdivision, 4½ miles west and 2 miles south of the southwest corner of Archer City.

Limey sandstone	hard	weathers to black slabs	1 Ft.
Sandstone	soft	gray	3
Shale	red	(exposed)	15
		Total	19

The Coleman Junction horizon is here represented by the sandstone, of which the upper one foot is 30 % lime.

The horizon is traced toward the northeast by correlations on sandstone escarpments to a small outlier near the south - east corner of Archer City. The outlier is shown in the following picture.

Station No. 6.

Fig. 10. Location, northeast corner of the west half of Section 1, Hooper and Wade Survey A - 727, near the south - east corner of Archer City. A small outlier on the south side of the road. The Coleman Junction is here represented by two feet of hard, black sandy limestone with soft gray sandstone above and below. Weathering produces many small chips of sandy lime scattered among boulders of sandstone.

The following picture shows in more detail the platy band of sandy limestone which here represents the Coleman Junction horizon.

Station No. 6.

Fig. 11. Location, same as preceding picture, (Fig. 10.). Showing in more detail the occurance of the black sandy lime, two feet thick, which represents the Coleman Junction, with soft gray sandstone above and below.

This is one of the most salient points along the horizon outcrop because of its content of lime so far from the typical limestone bed in the southwest part of the county. It also forms a distinct landmark which is easily spotted from an air-plane, and from this station air plane reconnaissance carries the horizon distinctly by a series of sandstone escarpments east and north through Clay County to the Red River.

Station No. 7.

Fig. 12. Location, west line of Block 56, Clark and Plum Subdivision 5, 2½ miles east and ½ mile north of Archer City. Soft gray sandstone four feet thick, correlated with the small outlier at the southeast corner of Archer City, (Station No. 6.) as the Coleman Junction horizon. The bed here forms a strong escarpment trending east and northeast toward the village of Scotland.

Station No. 8.

Fig. 13. Location, Block 37, Clark and Plum Subdivision 3, 2 miles south and 1 mile west of Scotland, in Archer County.

Fig. 13.

The section as measured at Station No. 8 is as follows:

Sandstone	soft, gray	5 Ft
Shale	red	45
Limey sandstone, dark, 30 % lime, weathers to black slabs and thin plates. (Coleman Junction)		1
Shale, red to purple, and clay-ball conglomerate		5
Shale	red (exposed)	10
	Total	66

A large slab of the sandy limestone which here represents the Coleman Junction limestone horizon, is shown in the foreground.

Station No. 8 is the last one shown for Archer County. From this station the outcrop follows an easterly course into Clay County along a series of sandstones to Station No. 9, near the location of the Nebraska - Texas oil well, in the northwest corner of the Carlton-Thompson Survey, A - 444, eleven miles south and three miles west of Henrietta. This part of the line of outcrop is clearly marked, the escarpments being bold and sharply defined, in many places resembling that shown in the picture for Station No. 8.

It is interesting to note that whereas the strike of the beds in most of Archer County is northeast, there is a change to an east - west direction near Scotland on the east edge of Archer County, and this easterly trend continues to Station No. 9 in Clay County.

The following pictures are shown for the horizon in Clay County, the stations being numbered from nine to thirteen inclusive.

Station No. 9.

Fig. 14. Location, northwest corner of the Carlton - Thompson Survey, A - 444, east of the Nebraska - Texas oil well, eleven miles south and three miles west of Henrietta, Clay County. This bed is forty five feet above the horizon of the Coleman Junction. Sandstone, soft, brown, five feet thick.

This sandstone forms a prominent escarpment traced to this location from the eastern part of Archer County, and continues east-northeast to the point where it crosses the Wichita Falls - Ft. Worth highway, near the north line of the R. Sunigas Survey, A - 408, seven miles northwest of Bellevue, Clay County.

Station No. 10.

Fig. 15. Location, south end of the I.& G.N.R.R. Survey A - 262, on the north side of the Wichita Falls - Ft. Worth highway, six miles northwest of Bellevue, Clay County. A prominent escarpment forty five feet high. The section is given below.

Sandstone	soft, brown	6 Ft.
Shale	red and brown	20
Sandstone	white (Coleman Junction)	2
Shale	red and brown	17
	Total	45

The following picture gives a closer view of this escarpment.

Station No. 10.

Fig. 16. Location same as for preceding picture. Showing in more detail the nature of the upper sandstone bed.

The escarpment continues well defined eastward to the northeast corner of Section 4 E&JKARR A - 861, thence less well defined to the northwest corner of Section 7, Jack County School Land A - 265. At this point the strike turns at nearly a right angle from an east - west line to a north-south line, forming a moderate escarpment at the turning point. The upper bed of sandstone is well exposed, with a thickness of four feet. Some large blocks lie scattered about, but the break in the pasture grass land is not nearly so pronounced here as in the locations a short distance to the west. The lower bed of white sandstone, representing the Coleman Junction, is here covered by soil.

From this point (Section 7) northward to the north line of T&NORR Survey A - 682, Section 1, the upper sandstone bed forms several noticable high points, but with no escarpment or good exposure. Near the north line (Section 1, T&NORR Survey, A - 682) is a typical exposure for the upper sandstone in this part of the area. It shows here as a grassy knoll in the pasture, with a few pieces of gray to brown sandstone showing at the surface. The east side of the knoll is about five degrees steeper than the west side, which is formed by a beautiful long sweep of gentle dip slope.

About half a mile north of this station there is a radical change in the direction of strike and appearance of topographic features, the whole being apparently related to the structural condition responsible for the Worsham oil pool in Section 3, T&NORR A - 685. The outcrop swings to the northwest in the southeast part of Section 2 (J. Cullwell Survey, A - 980), then back again to the northeast in Section 37 (H&TCRR A - 250) outlining the west end of the structure.

The next station is near the northwest corner of the southeast quarter of Section 37, H&TCRR A - 251, seven miles north of Bellevue. This is a stratigic position from which may be seen a wonderful panorama of topography and structural geology, outlined in bold strokes of red, brown, and white, expressed in terms of escarpment, badlands, grassy dip slope, and broad valley. The view is especially striking toward the

north, where the Coleman Junction horizon and associated beds are set out in bold relief as a result of erosion. But there is too much distance and detail for a small kodak, so the picture is confined to the small escarpment at the station point, showing an excellent exposure of the bed that is being followed. (See Fig. 17.)

Station No. 11.

Fig. 17. Location, Section 37, H&TCRR Survey A - 250, 7 miles north of Bellevue, Clay County. The section is given below.

Sandstone	gray to brown	6 Ft.
Shale	red to brown	16
Sandstone	white (Coleman Junction)	2
Shale	red to brown, sandy, (exposed)	5
	Total	29

In Section 24, nine miles north of Bellevue and two miles west of the east line of Clay County, there is apparently another noticable local change in the direction of line of outcrop, with a swing toward the northwest then back to the northeast. Perhaps this is only the result of erosion, with no real change in direction of strike. See Clay County map (Map No. 2.) between stations No. 11 and No. 12.

Fig. 18, Station No. 12, shows the nature of the sandstone escarpment for this part of the area. It is not so well defined as at some of the locations farther south, but is sufficiently distinct to be easily tracable to this point.

From Station No. 12 northward to the W. Dubois Survey A - 956, near the east line of Clay County, one mile west of Ringold (Montague County), the sandstone escarpment becomes quite indistinct, so that the line of outcrop must be followed by a series of rocky knolls best seen on the basis of long range correlation over a broad sweep of country, rather than by an attempt to trace the outcrop in detail.

The following picture shows the outcrop at Station No. 12.

Station No. 12.

Fig. 18. Location, southeast corner of Section 3, H&TCRR Survey A - 243, near the west line of the W. Dubois Survey A - 956, 1 mile west of Ringold, Montague County, the Station being located in Clay County. A good exposure of the outcrop where the country road makes a right angle turn to follow the survey lines, with an extra curve to get up the hill. The section here is as follows.

Sandstone, gray to white	4 Ft.
Shale brown to red	15
Sandstone, white, broken, (Coleman Junction)	2
Sandy Shale, red to brown, (exposed)	2
Total	23

Figure 19 shows the sandstone escarpment on the south side of the Red River, north of Ringold.

Station No. 13.

Fig. 19. Location, near the R. I. R. R. bridge, 3½ miles north of Ringold, Montague County, and ½ mile east of the north end of the Montague - Clay County line. This escarpment extends northwest along the south side of the Red River, becoming gradually lower, and correlates with a sandstone on the Oklahoma side of the river known as the Ryan Sandstone. The section at this location is given below.

Sandstone	gray		6 Ft.
Shale	brown to red		20½
Shale	white		½
Shale	red and brown		23
Sandstone	white	(Coleman Junction)	2
Shale	red and brown	(exposed)	10
		Total	62

Air-Plane Reconnaissance in Archer and Clay Counties.

The field conference of geologists from Wichita Falls and Ardmore established the correlation of the sandstone escarpment west of Bellevue (Station No. 10.) with the escarpment on the south bank of the Red River (Station No. 13) which in turn was correlated with the Ryan Sandstone of Oklahoma, to the satisfaction of members of the party.

Following this conference the writer was fortunate in being offered the use of the Continental Oil Company plane, with an excellent pilot, for further study of the beds in Clay and Archer Counties. Two trips were made on different days with Mr. Karl Walters, geologist for the Continental Oil Company.

Opinions among geologists of the Wichita Falls area had differed concerning the direction of strike of the beds in northeastern Clay County. Some traced the beds from near Bellevue northeast into Montague County, others believed that the strike turned more sharply north-northeast and passed a short distance south of Ringold to the Red River, whereas our field conference had just approved correlations tracing the beds north to the river north of Ringold.

The object of the air-plane reconnaissance was to obtain a check on these different possible correlations, and to trace the beds westward into Archer County.

The first day we began with the problem of following the escarpment from the Nebraska-Texas oil well in Clay County (see Figure 14) east and northeast to the Red River. Flying at an altitude of about 1500 feet above the country surface, correlations were carried clearly to the point northwest of Bellevue shown in Figure 15, and from there an effort was made to trace the beds into Montague County on an assumed northeast strike. The correlations as observed did not agree with such a strike, but the flight was continued in that direction as far as Montague, County Seat of Montague County, before turning back.

A new start was then made from the Nebraska-Texas oil well and the escarpment was again followed to the point northwest of Bellevue (see Figure 15), and continued thence east and north with satisfactory correlations to the locality of Station No. 13, west of Ringold, from which point we tried to trace the beds on an assumed northeast strike into Montague County, passing near Ringold and on to the Red River. Correlations as observed from the plane were not satisfactory after we turned northeast near Ringold. We then returned to the outcrop where it is well defined north of Bellevue, and followed it this time north to the Red River in the northeast corner of Clay County as traced by the field conference, with observations and correlations apparently satisfactory. This ended the work for the first trip.

The following day we went over the area with a car, from the Nebraska - Texas well to the Red River, spotting on the map land marks observed from the plane, such as large barns, houses, or isolated hills.

The second trip with the plane began the study at the Nebraska - Texas well, and with careful checking of the land marks spotted on the map, the line of outcrop was sketched in as far north as the river. An attempt was then made to trace the outcrop (see Figure 19) northwest along the south bank of the river, searching for some correlation other than with the Ryan Sandstone. Correlations were not satisfactory in this effort and a return was made to Ringold for another attempt. This time the flight continued up the river for a short distance, then crossed to the Oklahoma side, observations apparently confirming the correlation of the bed with the Ryan Sandstone as established by the field conference.

We then returned to the Nebraska - Texas well and traced the escarpment westward into Archer County, passing south of Scotland and on to Archer City. The same route was covered a second time to recheck certain parts of the correlations, with satisfactory results, following which the flight was continued southwest of Archer City about five miles to some escarpments and land marks with which the writer was already familiar. This concluded the second trip.

Maps Accompanying this Thesis.

Four large maps accompany this thesis and form an essential part of it. They may be described as follows.

Map No. 1. shows the course of the Coleman Junction horizon across Archer County as interpreted by the writer. The line is drawn from near the southwest corner of the county to the south edge of Archer City, and passes into Clay County at a point east of Scotland.

Map No. 2 continues the line through Clay County, following in general an eastward direction to a point three and a half miles north of Bellevue, where it turns northward to the Red River.

Map No. 3 shows the course of the Coleman Junction horizon across Archer County, together with other beds used for correlations, as worked out by Mr. V. E. Timms.

Map No. 4 continues the correlations of map No. 3, carrying them across Clay County.

Coleman Junction limestone as a dividing line between the Pennsylvanian and the Permian.

In the area southwest of Archer County the Coleman Junction limestone makes an easily tracable and convenient marker for the dividing line between the Pennsylvanian and the Permian systems, on account of its lithological characteristics and topographic expression.

It was first placed as the lowest bed of the Permian by Drake because it was thought to contain Permian fossils. It was later placed as the upper bed of the Pennsylvanian by Plummer and Moore because the included fossils were thought to have more of a Pennsylvanian than a Permian aspect. (2) This latter classification has been generally accepted, and is regarded as holding true for Archer and Clay counties, although in these counties no fossil evidence appears to be available because of changed conditions of sedimentation.

(2) Ibid., pp. 182, 184, 188, 190.

Exceptional Features of This Area.

The Coleman Junction limestone or its equivalent horizon has been accepted as the contact bed between the Pennsylvanian and the Permian systems, partly on the basis of lithology and topography, and partly on the basis of paleontological evidence. There are difficulties in carrying this interpretation through Archer and Clay counties, where a line based on topography and lithology is more readily drawn south of the one outlined in this thesis. Such a line would begin with a well-defined escarpment of apparently typical Permian sandstones and shales in the south half of the J. Scott Survey A - 374, nine miles east and two miles north of the southwest corner of Archer County. From this point such a line would run south of Anarene in south-central Archer County, through Windthorst on the east edge of Archer County, to the village of Joy in south-central Clay County, thence to Bellevue near the east edge of Clay County, thence north and east into Montague County, passing three miles east of Ringold to the Red River about ten miles down-stream from the point at which the Coleman Junction horizon, as interpreted in this thesis, reaches the Red River.

It appears, therefore, that in this area, there are two lines that may be drawn as the possible contact between the Pennsylvanian and the Permian systems, one based on actual mapping of the Coleman Junction or its equivalent horizon,

and the other based on topography, lithology, soils, and vegetation. This seems to be explained by changing conditions of sedimentation in the Red River area as compared with the area farther south. Apparently the marine sedimentation southwest of Archer County gives place to deposition of red beds in the Red River area. On this phase of the problem an interesting statement is given by C. W. Tomlinson of Ardmore, Oklahoma, showing that similar conditions exist on the north side of the Red River. (3)

Map by Hubbard and Thompson.

The following map shows the Coleman Junction in Archer County as drawn by Hubbard and Thompson. It is probably the first published map showing that the line of contact between the Pennsylvanian and the Permian swings as far north as the vicinity of Archer City. (4)

(3) Tomlinson,C.W., The Pennsylvanian System in the Ardmore Basin, Oklahoma Geological Survey, Bulletin No. 46, March, 1929, pp. 61 - 62.

(4) Hubbard,W.E., and Thompson, W.C., The Geology and Oil Fields of Archer County, Texas: Bulletin of the American Association of Petroleum Geologists , Vol. 10, Part 1, May 1926, p. 460.

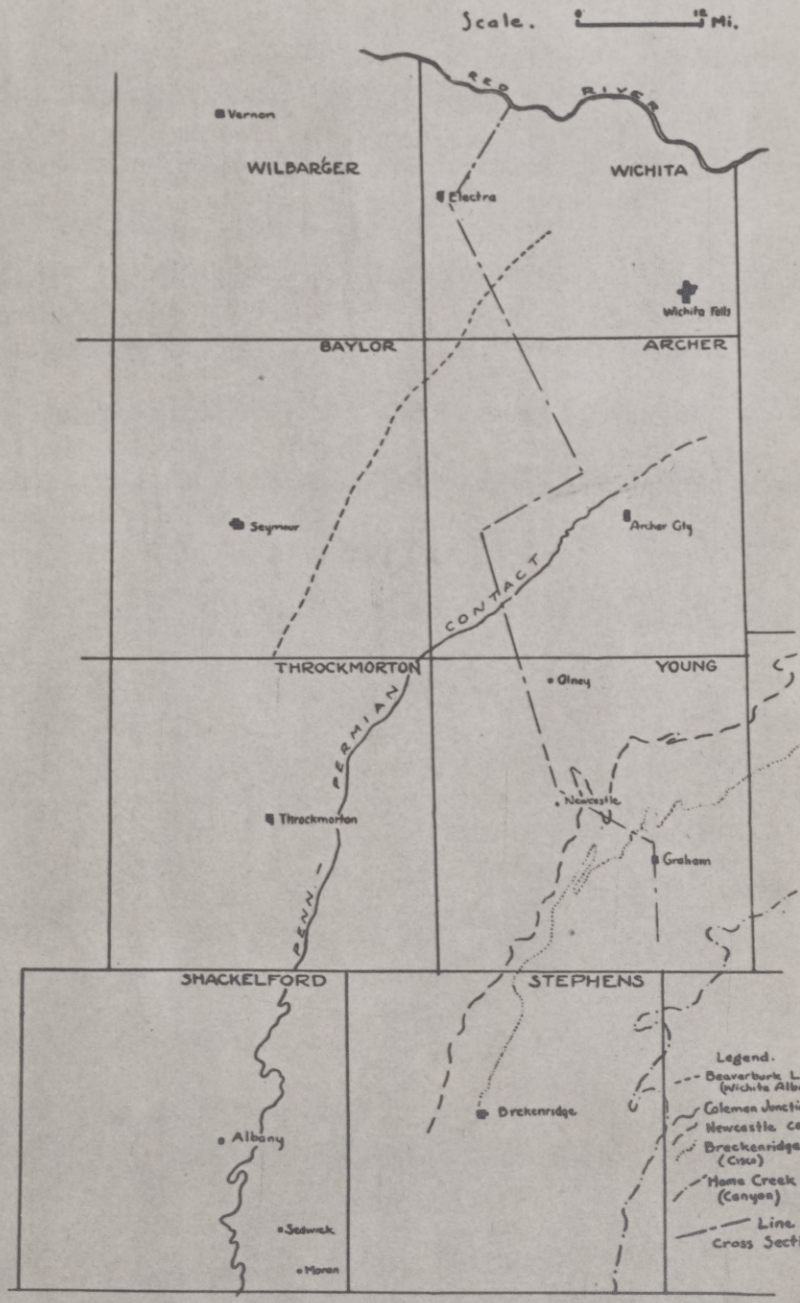


FIG. 1.—Map showing the Pennsylvanian-Permian contact and the outcrop of other key horizons in north-central Texas.

Map by Tomlinson.

The following map is by Tomlinson. (5) It shows his interpretation of the Pennsylvanian - Permian contact in southern Kansas, Olkahoma, and northern Texas. He correlates the Coleman Junction with the Ryan Sandstone of Oklahoma, this being largely based on the results of the field conference in northeast Clay County and in the Ryan area previously refered to. Tomlinson expresses the opinion that the Cisco group is represented in the lower part of the Oklahoma red beds which have been refered to the Clear Fork and Wichita formations of the Permian.

(5) Ibid., Tomlinson.

POST-PONTOTOC (CISCO?) RED BEDS

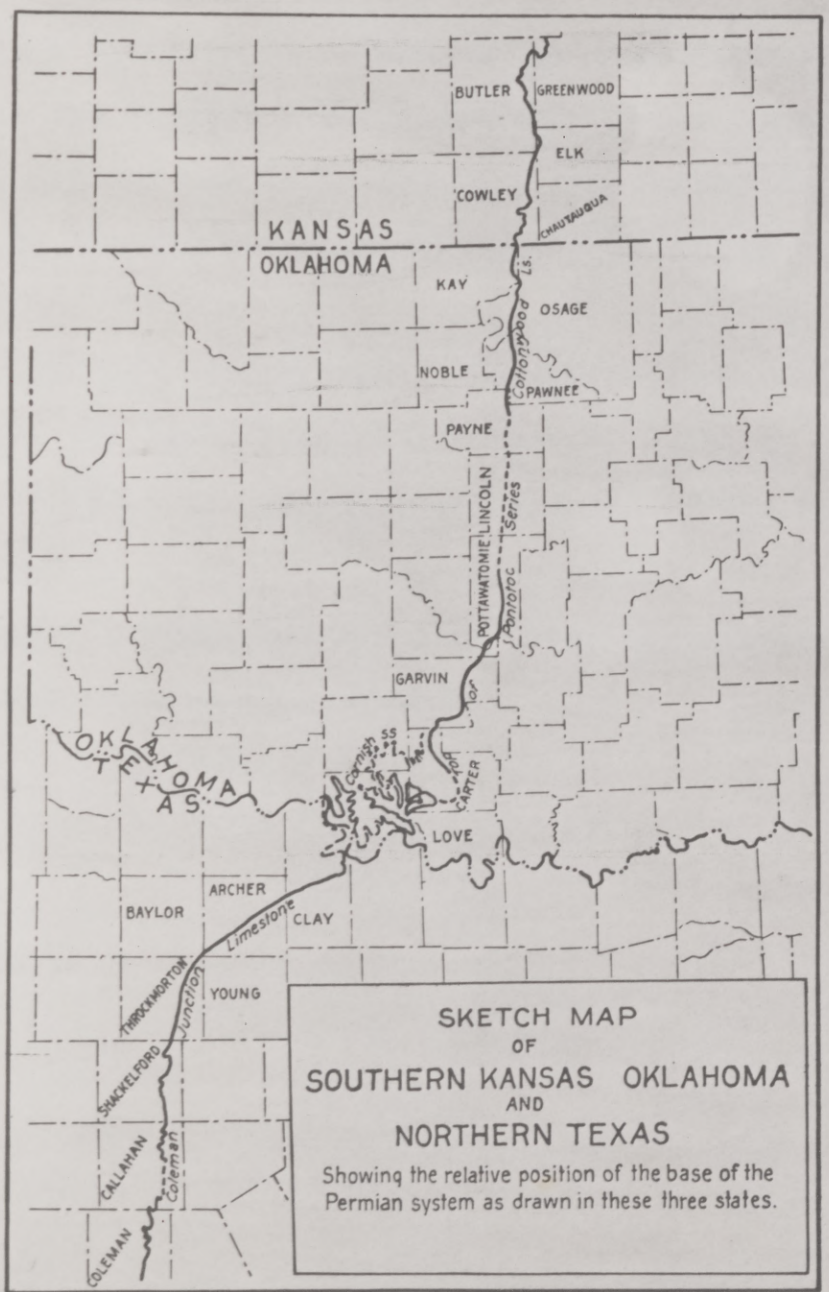


Plate No. 2.

Conclusions.

The Coleman Junction limestone may be traced for a short distance in the southwest part of Archer County, and its equivalent horizon may be traced in a general northeast direction to the Red River in the northeast corner of Clay County.

This horizon may be considered the approximate dividing line between the Pennsylvanian and Permian systems, but it does not represent the southeastern extent of the red beds in this area.

The Coleman Junction horizon correlates approximately with the Ryan Sandstone of Oklahoma.

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Hubbard, W. E., and Thompson, W. C. : Geology and Oil Fields of Archer County, Texas, Bulletin of the American Association of Petroleum Geologists, Vol. 10, Part 1, May 1926.

Plummer, F. B., and Moore, R. C. : Stratigraphy of the Pennsylvanian Formations in North Central Texas, University of Texas Bulletin 2132, June 5, 1921.

Tomlinson, C. W. : The Pennsylvanian System in the Ardmore Basin, Oklahoma Geological Survey, Bulletin No. 46, March 1929.

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ARCHER CITY

Harris Sub-Div of Club Ranch

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JEFFERSON COUNTY SCHOOL LAND A240

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Map No. 1.
Archer County, Texas.
Outcrop of the
Coleman Junction Horizon
As Interpreted by
C. O. Nickell.

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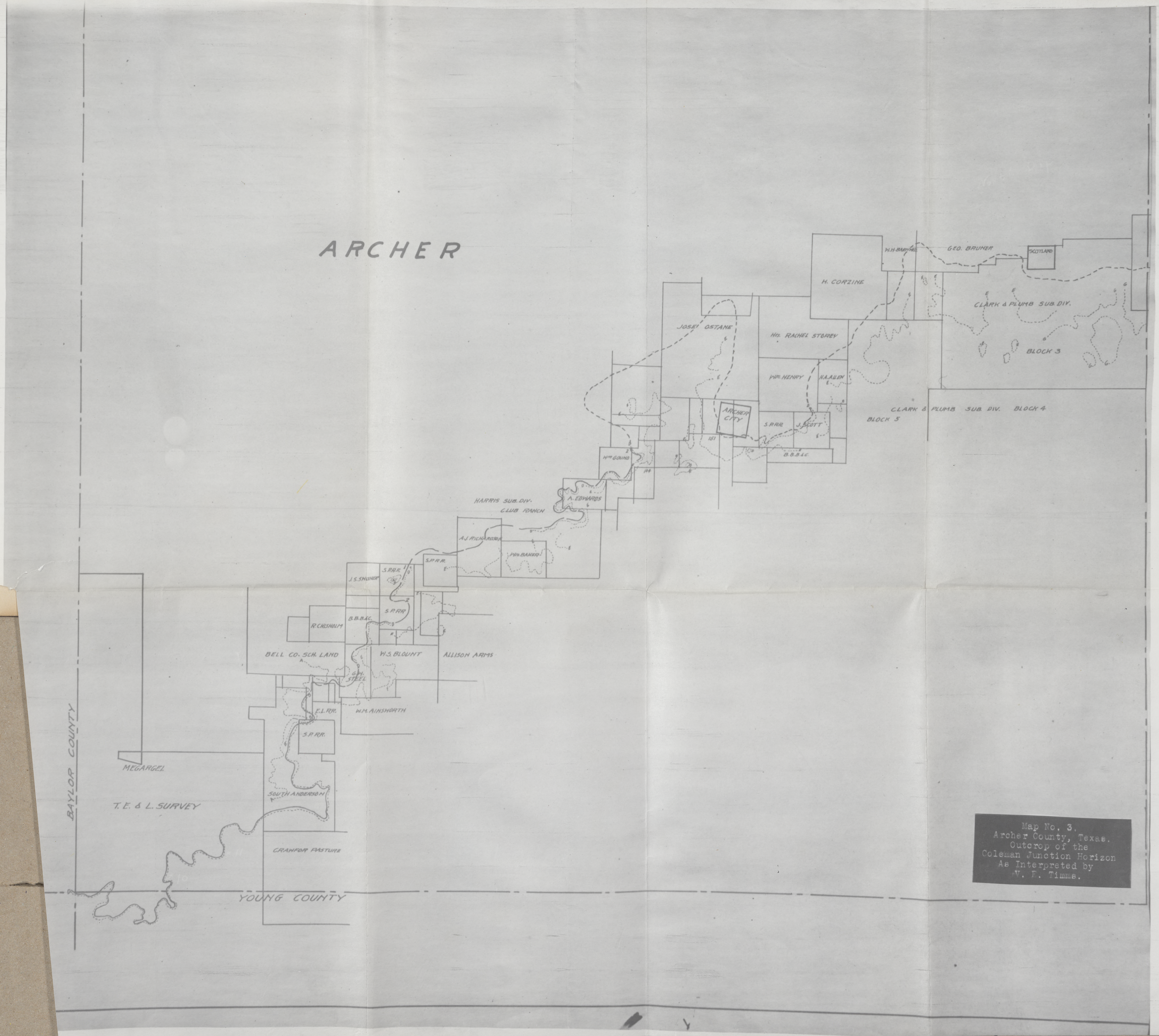
Legend

Map No. 2.
Clay County, Texas.
Outcrop of the
Coleman Junction Horizon
As Interpreted by
C. O. Rickel



Map No. 3.
Archer County, Texas.
Outcrop of the
Coleman Junction Horizon
As Interpreted by
V. E. Timms.

Map No. 4.
Clay County, Texas.
Outcrop of the
Coleman Junction Horizon
As Interpreted by
V. E. Timms.